



CHINA ELECTRICITY COUNCIL  
Electric Transportation & Energy Storage Association

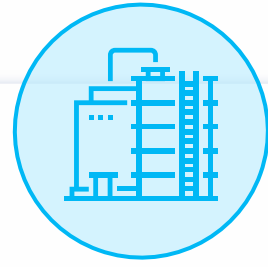
# New Energy Storage Technologies Empower Energy Transition (synopsis)



May 2023

[kpmg.com/cn](http://kpmg.com/cn)

# Foreword



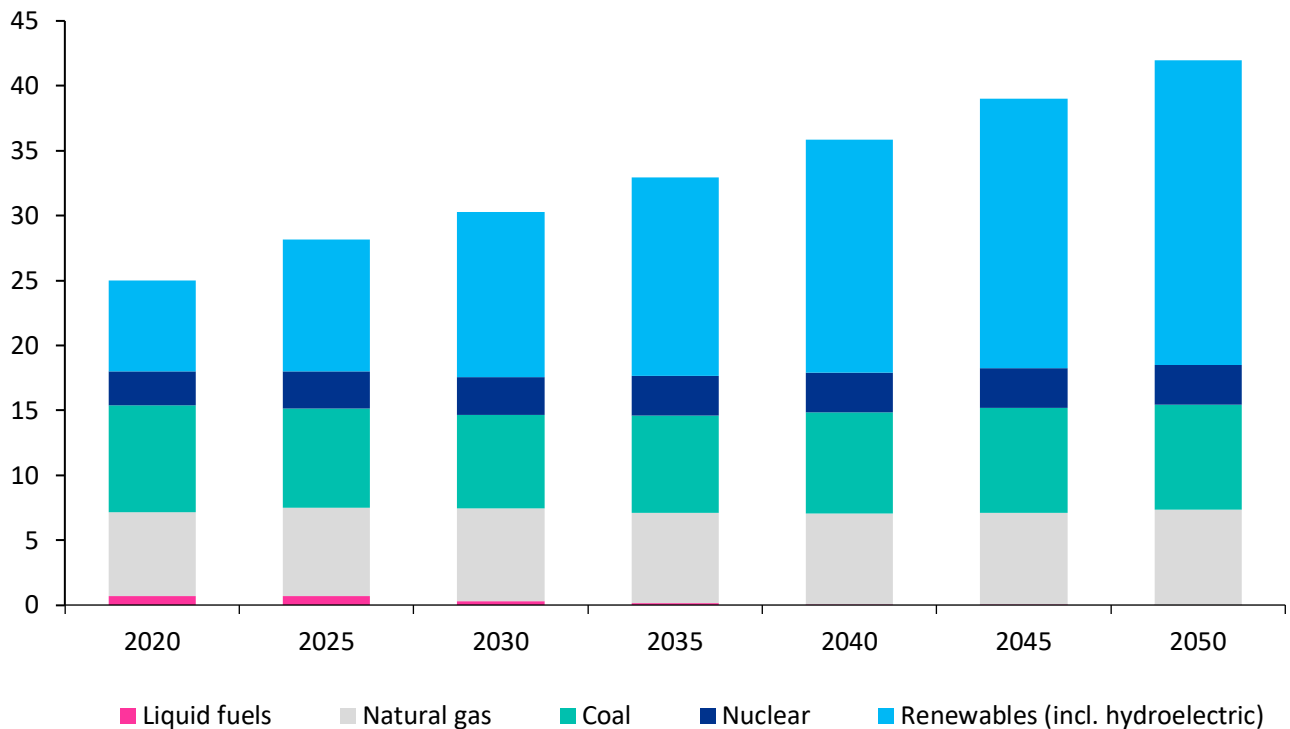
Stepping up efforts to develop new energy storage technologies is critical in driving renewable energy adoption, achieving China's 30/60 carbon goals, and establishing a new power system. In January 2022, the National Development and Reform Commission and the National Energy Administration jointly issued the Implementation Plan for the Development of New Energy Storage during the 14th Five-Year Plan Period, emphasizing the fundamental role of new energy storage technologies in a new power system. The Plan states that these technologies are key to China's carbon goals and will prove a catalyst for new business models in the domestic energy sector. They are also strategically important for international competition.

KPMG China and the Electric Transportation & Energy Storage Association of the China Electricity Council ('CEC') released the *New Energy Storage Technologies Empower Energy Transition* report at the 2023 China International Energy Storage Conference. The report builds on the energy storage-related data released by the CEC for 2022. Based on a brief analysis of the global and Chinese energy storage markets in terms of size and future development, the publication delves into the relevant business models and cases of new energy storage technologies (including electrochemical) for generators, grids and consumers. It also takes a closer look at the steps taken by industry players to build their presence and investments and fund-raising outcomes. The report concludes with a look into the future, focusing on the opportunities and challenges for industry players on the road ahead. The English version of the report is an abbreviated synopsis of the Chinese report that was released in March 2023.

# 1. Electrochemical and other energy storage technologies have grown rapidly in China

Global wind and solar power are projected to account for 72% of renewable energy generation by 2050, nearly doubling their 2020 share. However, renewable energy sources, such as wind and solar, are liable to intermittency and instability. This will be a driving force for the global energy storage market (Figure 1).

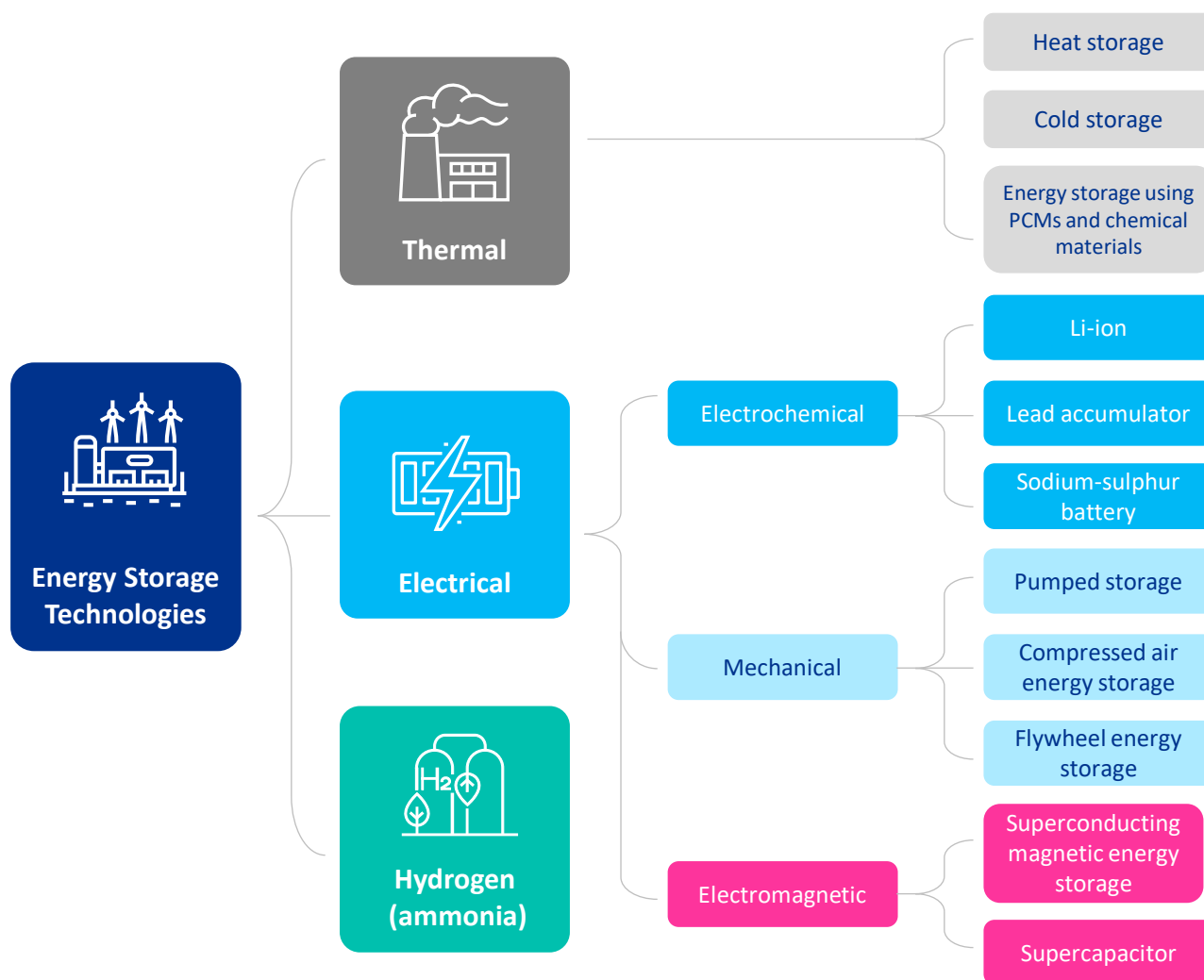
**Fig. 1** | Power generation forecast for different energy sources worldwide, 1000TWh



Source: EIA, Statista, KPMG analysis

Depending on how energy is stored, storage technologies can be broadly divided into the following three categories: thermal, electrical and hydrogen (ammonia). The electrical category is further divided into electrochemical, mechanical and electromagnetic (Figure 2). Though pumped storage is predominant in energy storage projects, a range of new storage technologies, such as electrochemical, are rapidly gaining momentum.

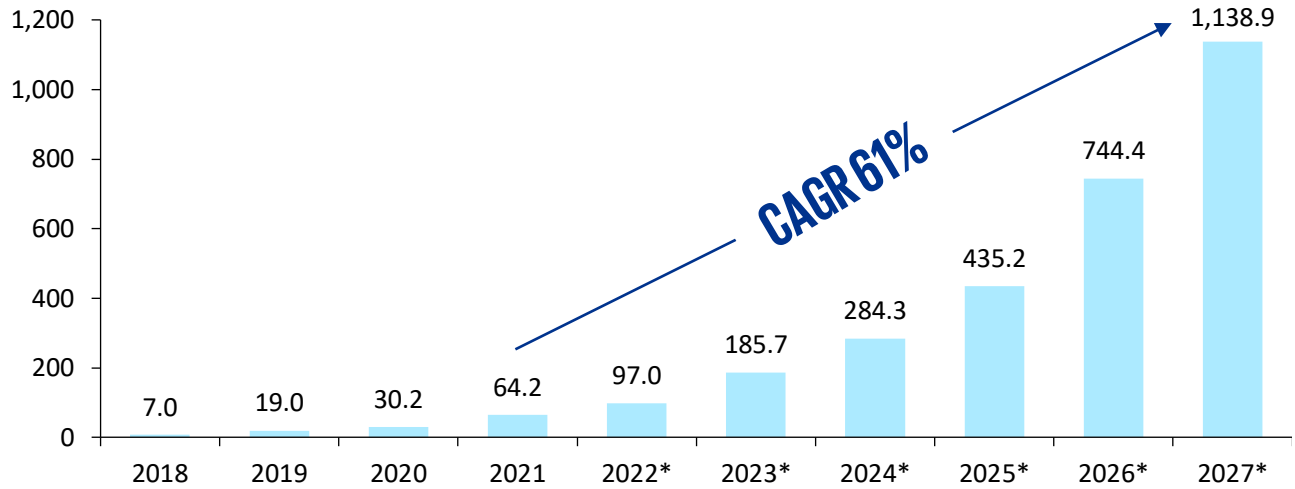
Fig. 2 | Energy storage technologies



Source: KPMG analysis

Based on CNESA’s projections, the global installed capacity of electrochemical energy storage will reach 1138.9GWh by 2027, with a CAGR of 61% between 2021 and 2027, which is twice as high as that of the energy storage industry as a whole (Figure 3).

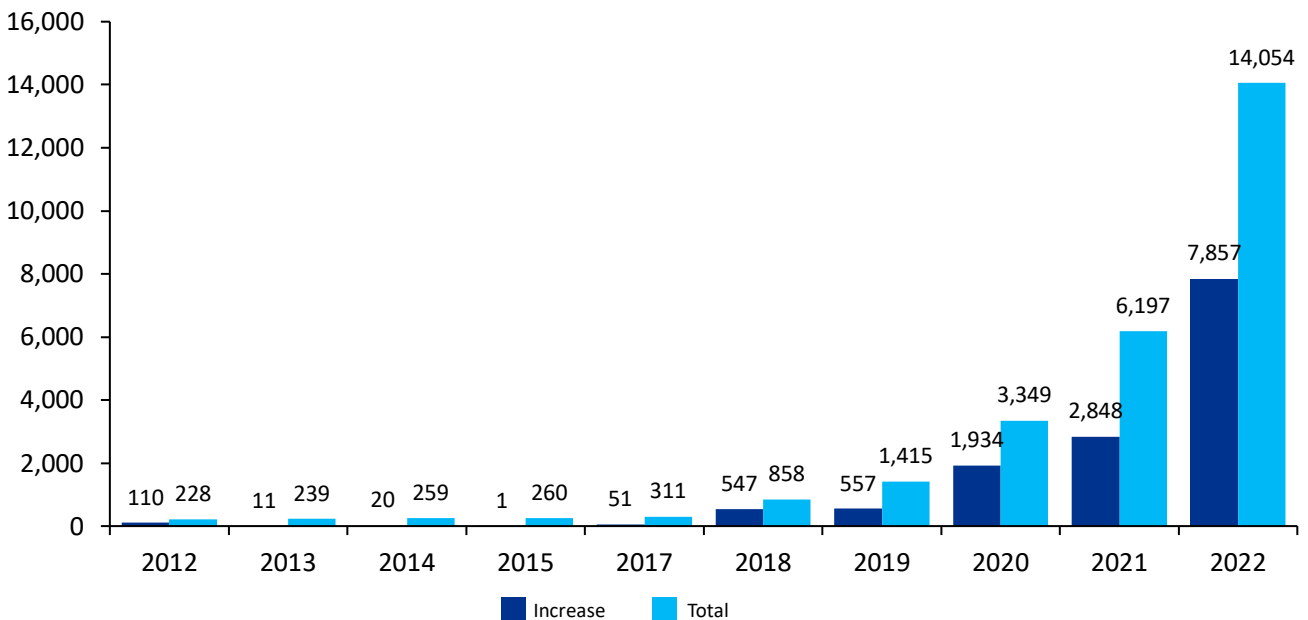
**Fig. 3** | Global installed electrochemical energy storage capacity, GWh



Source: CNESA, KPMG analysis  
\*Projections

In terms of developments in China, 19 members of the National Power Safety Production Committee operated a total of 472 electrochemical storage stations as of the end of 2022, with a total stored energy of 14.1GWh, a year-on-year increase of 127%. In 2022, 194 electrochemical storage stations were put into operation, with a total stored energy of 7.9GWh. These accounted for 60.2% of the total energy stored by stations in operation, a year-on-year increase of 176% (Figure 4).

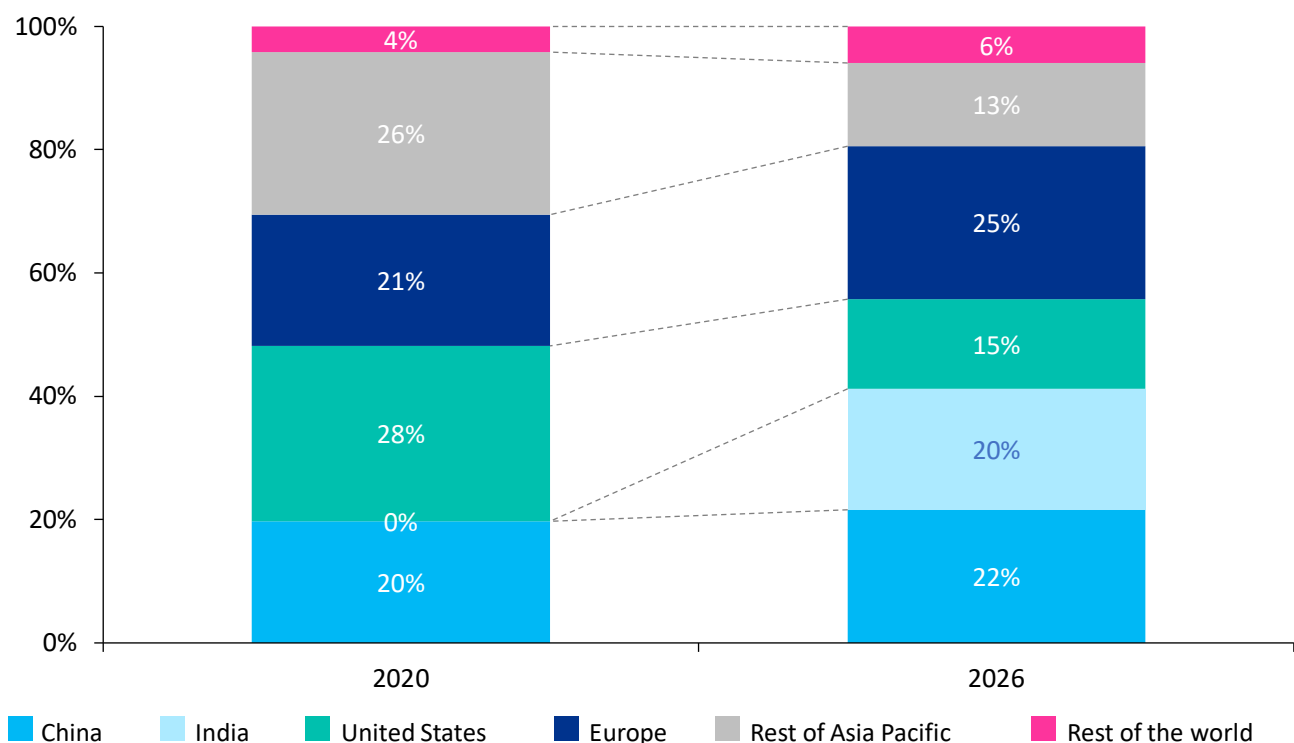
**Fig. 4** | Installed electrochemical energy storage capacity in China, MWh



Source: China Electricity Council, KPMG analysis

From an international perspective, the IEA estimates that China will have the highest installed electrochemical energy storage capacity by 2026, accounting for 22% of the global total. By then, China will be on a par with Europe and outstrip the US by 7 percentage points (Figure 5).

**Fig. 5** | Projected total installed capacity of electrochemical energy storage in various countries and regions



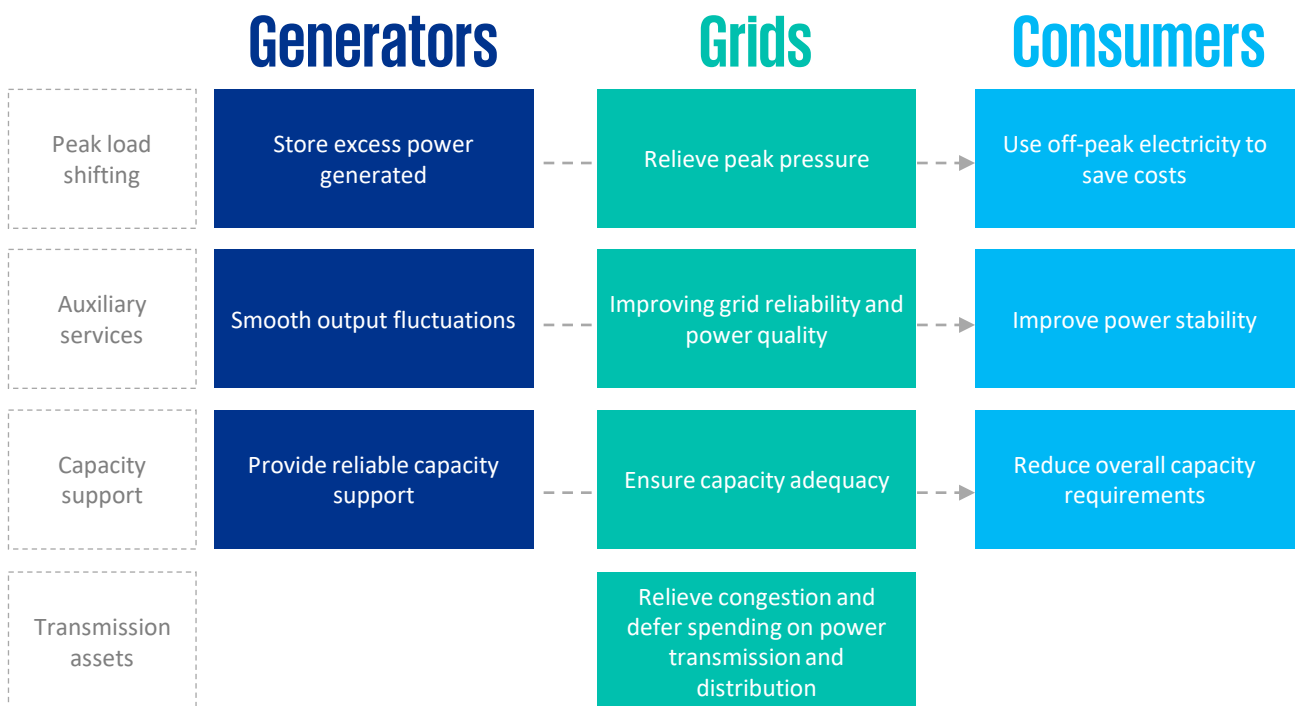
Source: IEA, KPMG analysis



# 2. Energy storage can have a major impact on generators, grids and end users

When it comes to energy storage, there are specific application scenarios for generators, grids and consumers. Generators can use it to match production with consumption to ease pressure on grids. Storage technologies can help grids reduce or defer spending on equipment, alleviate congestion and enable auxiliary services such as peak shaving and frequency regulation for power systems. Consumers can use them for peak load shifting purposes and for generating electricity using photovoltaics for their own consumption to reduce electricity bills (Figure 6).

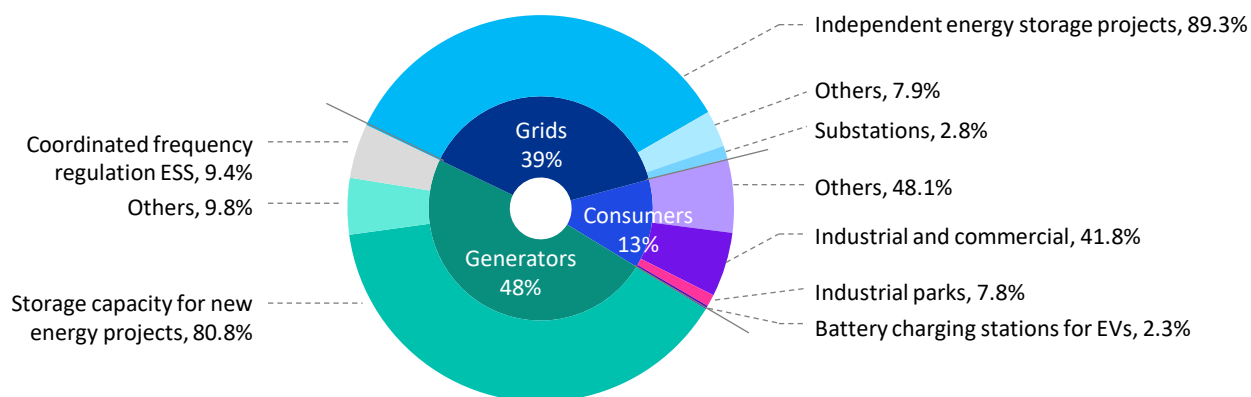
**Fig. 6** | The value of energy storage for different stakeholders



Source: KPMG analysis

According to data from the China Electricity Council, the cumulative installed capacity of electrochemical storage stations that were operational in China as at the end of 2022 is mainly through generators, with total energy of 6.8GWh. These accounted for 48% of the cumulative installed capacity of electrochemical storage stations, followed by grids (39%) and consumers (13%). In terms of segments, generators focus on new energy distribution and storage (81%), grids on independent energy storage (89%), and consumers on industrial and commercial applications (42%) (Figure 7).

**Fig. 7** | Electrochemical energy storage application scenarios in China in 2022



Source: China Electricity Council, KPMG analysis

## Government policies encourage adopting energy storage among generators

For generators in China market, electrochemical energy storage is mainly used for frequency regulation by thermal power generators and for energy storage by renewable power generators. The former application scenario has a very limited market size, with generators mainly focusing on new energy distribution and storage in the application of electrochemical energy storage technologies. A range of factors, including high costs, lack of channels for revenue generation, and low efficiency, have held back new energy distribution and storage projects among generators. Development in this segment is mainly driven by government policies. From a national perspective, the National Energy Administration issued the *Notice on Encouraging Renewable Power Generation Enterprises to Build or Purchase Peak Shaving Capacity to Increase the Scale of Renewable Energy Connected to Grids* in July 2021. It is proposed that “in order to encourage power generation enterprises to participate in the construction of peak shaving resources in a market-oriented manner, they should build peak shaving capacity for power generated in excess of the scale that grid companies guarantee to be connected to grids, at 15% of the power ratio. When it comes to connection to grids, priority will be given to companies that build such capacity at 20% of the power ratio.”



From a local perspective, most provinces and municipalities require new energy projects to be equipped with an energy storage capacity based on a certain power ratio, and some even subsidise energy storage projects. According to a survey by the China Electricity Council, new energy distribution and storage projects have a low equivalent utilisation co-efficient of 6.1%, the lowest among the application scenarios, while the average for electrochemical energy storage projects is 12.2% (Figure 8).

**Fig. 8** | Required renewable energy storage capacity in provinces and municipalities

Provinces (provincial-level municipalities)	Storage capacity as a percentage of power ratio		Duration (hours)
	Wind	Solar	
Tianjin	15%	10%	-
Hunan	15%	5%	2
Guangxi	20%	15%	2
Fujian	-	10%	-
Hainan	-	10%	1
Hubei	10%	10%	2
Shandong	10%	10%	2
Qinghai	10%	10%	2
Ningxia	10%	10%	2
Shanghai	20%	-	4
Jiangxi	-	10%	1
Inner Mongolia	15%	15%	2 or 4
Liaoning	15%	10%	3
Anhui	10%	10%	1
Shanxi	10%	10-15%	-
Shaanxi	10-20%	10-20%	2
Jiangsu	-	8-10%	2
Hubei	10-15%	10-15%	2
Henan	10-20%	10-20%	2
Gansu	5-10%	5-10%	2
Zhejiang	10-20%	10-20%	2
Hainan	-	20-25%	2
Xinjiang	-	15-20%	-

Source: Compilation based on provincial government and energy bureau policies, KPMG analysis

Note: Based on renewable energy distribution and storage policies as of October 2022.

## Business models of energy storage for power grids still needs to be improved

In terms of investment and operation, power grid enterprises lack the motivation to invest in energy storage projects as there are settlement problems for non-independent energy storage projects. In 2019, the National Development and Reform Commission required the cost of energy storage facilities to not be included in the pricing of power transmission and distribution. Moreover, the Big Two grid companies--State Grid Corporation of China and China Southern Power Grid Corporation-- successively implemented strict control over grid-related investments. These measures have discouraged grid companies from building new energy storage capacity. The majority of the increased installed energy storage capacity after 2019 has been on the power supply side, with a few existing energy storage projects in operation being connected to grids. Energy storage projects that are capable of being directly scheduled by grids, or that choose to settle costs with them, generally adopt a contract-based energy management model. Projects running under such a model are usually not independent entities that are able to perform functions, including measurement, scheduling, and settlement. They can only participate in the electricity market indirectly through power grid enterprises, and, in some cases, grid owners may be in arrears with payments.

In terms of revenue and pricing, the bottleneck lies in the power grid companies' inability to pass costs on to consumers, and there is an urgent need for them to explore mechanisms for recovering capacity costs and develop the spot electricity market. For power grids, energy storage revenue mainly comes from compensation for auxiliary services such as peak shaving and frequency regulation. At least 19 provincial-level regions have defined standards for compensation for peak shaving and frequency regulation. In accordance with the Whoever Provides the Service Should Reap the Profits and Whoever Benefits from the Service Should Bear the Costs principle, the compensation for auxiliary services should be jointly borne by generators and consumers. However, grids have difficulty in passing the costs of their auxiliary services onto consumers, which may somewhat hinder the development of this market. In developing energy storage, Chinese power grids need to explore mechanisms for recovering capacity costs while developing the spot electricity market, as their foreign peers do, to improve the way costs are passed on and to expand revenue sources.

## Independent energy storage stations are a rising trend among generators and grids

Independent energy storage stations are a future trend among generators and grids in developing energy storage projects. They can be monitored and scheduled by power grids when connected to automated scheduling systems and meet the relevant standards, regulations and requirements applicable to power market entities.

Channels available for independent energy storage stations to generate revenue include participating in the spot electricity (i.e. to arbitrage price differences) and capacity markets, leasing out their capacity, and providing auxiliary services (Figure 9). As different rules prevail in regional markets and energy storage projects are run in different ways, entities that operate energy storage projects, in most cases, are unable to monopolise the revenue from all channels and need be content with the income generated from one or two of them.



Independent energy storage stations can meet the needs for energy storage by generators and for peak shaving and frequency regulation by power grids, expanding their channels for revenue generation and improving their economic potential. They will be an important direction for the development of energy storage stations in the future. As the market-oriented reform of the power sector is advanced in China, independent energy storage stations will have an increased chance to participate in the spot electricity market, while the auxiliary service market is also opening up for them. In the future, they can expand their revenue sources and promote the development of the independent energy storage market by participating in power-related auxiliary services, such as peak shaving and frequency regulation, and leasing out their capacity.

**Fig. 9** | Revenue sources for independent energy storage stations

Revenue source	Description	Income
<b>Spot power trading</b>	Independent energy storage stations purchase and sell electricity in the spot market, and the corresponding charging volume is not subject to transmission and distribution costs, contributions to government funds, and surcharges.	This helps generate income by arbitraging price differences.
<b>Capacity compensation</b>	The capacity market is an important component of the power market system and is designed to ensure adequate long-term capacity across the power system.	This enables generator units to generate stable income from a source beyond the electricity market and auxiliary service market. There is currently no nationwide capacity market in China. Some regions such as Shandong and Qinghai are piloting a capacity charge mechanism for energy storage stations.
<b>Capacity leasing</b>	Independent energy storage stations lease capacity to wind power, PV, and other new energy stations.	Capacity leasing is a stable source of income for owners of independent energy storage power stations. The capacity leased can be seen as energy storage capacity built for new energy projects.
<b>Auxiliary services</b>	This market includes peak shaving and frequency regulation	The compensation for peak shaving and frequency regulation varies among provinces, mainly based on the electricity consumed to charge batteries for peak shaving purposes.

Source: KPMG analysis

## Consumers play a key role in overseas energy storage markets, while industrial and commercial users are the main driver in China

Energy storage projects are mainly undertaken by consumers, including industrial and commercial consumers and household consumers. High electricity prices, reduced costs and policy support have boosted overseas consumer storage markets. In terms of residential electricity prices in 2021, households in European countries, such as Denmark, Germany and the UK, paid more than USD0.3 per kilowatt of electricity, which is twice as much as the price paid by households in the US and nearly thrice as much as that paid by residential consumers in China (Figure 10). In 2022, with skyrocketing natural gas prices as a result of an extreme summer drought in European countries and the Russia-Ukraine conflict, European electricity prices hit new highs. By combining PV panels and energy storage systems, residential consumers can generate more electricity for their own use as an insurance against rising prices.

**Fig. 10** | Average household electricity prices in major countries and regions in 2021, USD/KWh

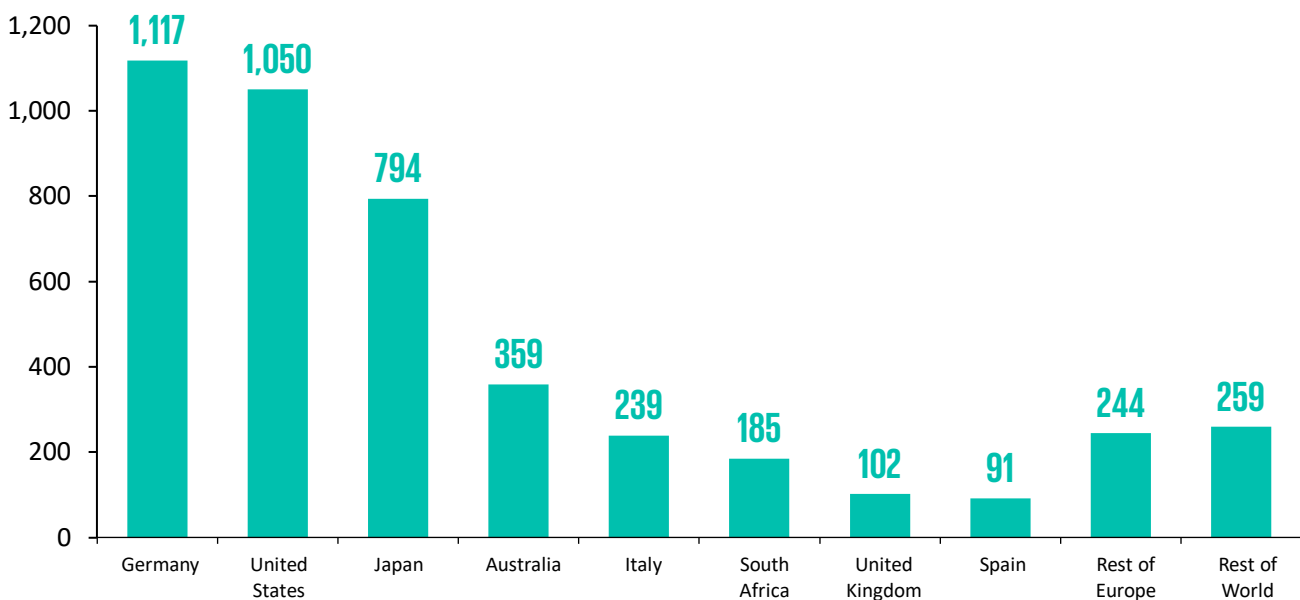


Source: Global Petroleum Prices, Statista, KPMG analysis

Increasing PV penetration and decreasing installation costs contribute to a growing market. Europe and the US are highly urbanised with the bulk of the population living in detached homes ideally suited for installing PV panels. At the same time, countries have accelerated energy transition and are encouraging households to generate electricity using PV panels for their own use. In 2021, average installed solar PV capacity per household in the 27 EU countries reached 355.3 watts, an increase of 40% compared with 2019. In terms of penetration rate, residential installed solar PV capacity accounts for 66.5%, 25.3%, 34.4% and 29.5% of the national total photovoltaic installed capacity in Australia, the US, Germany and Japan, respectively. With a penetration rate 10 times higher than that of China, these countries are well-positioned to develop residential energy storage. In addition, the price of lithium battery packs, a widely used equipment for residential energy storage and the biggest cost contributor, decreased from \$684/kWh in 2013 to \$132/kWh in 2021, a decline of 81%. This is also a boost to residential energy storage.

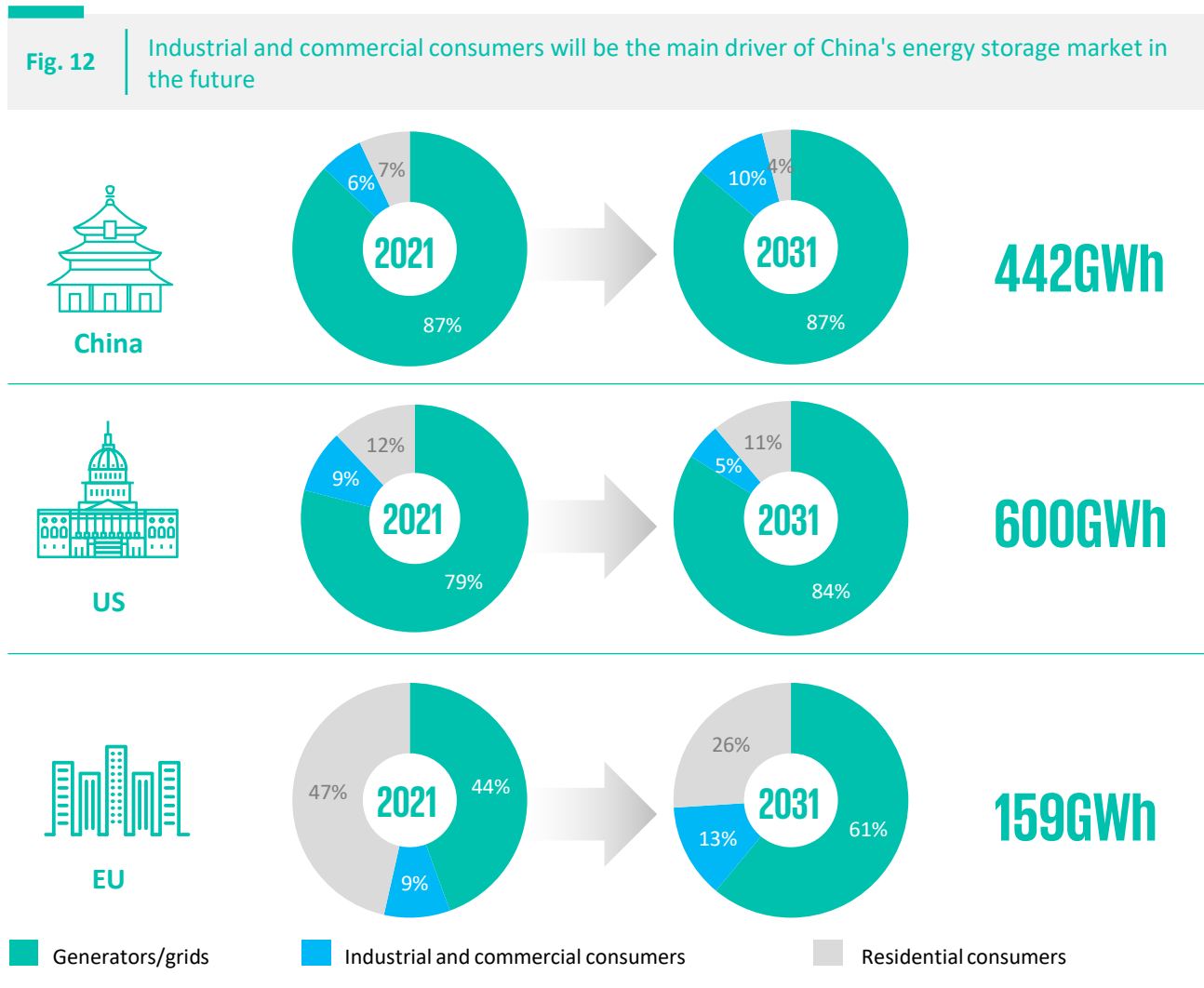
In terms of output, global residential energy storage shipments in 2020 reached 4.44GWh, a year-on-year increase of 44.2%, with Europe and the US being the top players. In the European market, Germany recorded the fastest growth. With shipments exceeding 1.1 GWh, it was also the top player globally, followed by the US where shipments also exceeded 1 GWh (Figure 11).

**Fig. 11** | Residential energy storage shipments in 2020, MWh



Source: IHS Markit, Statista, KPMG analysis

Compared with overseas markets, in which households play a primary role in energy storage, industrial and commercial consumers are the main driver of China’s energy storage market. According to a projection of Wood Mackenzie, industrial and commercial energy storage systems will account for 10% of China’s energy storage market by 2031, with a total installed capacity of 442GWh, an increase of 4 percentage points from 2021, making it a major growth market segment (Figure 12). As the time-of-use electricity price system is further improved and the electricity prices for energy-intensive enterprises increase, the economics of energy storage for industrial and commercial consumers has increased significantly. In 2021, some provinces and municipalities in China experienced power outages and shortages due to extreme weather conditions such as drought. The resulting disruptions to production and operations in businesses boosted the demand for energy storage.



Source: Wood Mackenzie, KPMG analysis

<sup>1</sup> Why implement 'power rationing' and cutting off power supply? Experts analyse several key questions, <https://news.cctv.com/2021/09/29/ARTIU1TOyuNwWF60opflqbM210929.shtml>

There is an extensive range of application scenarios for industrial and commercial energy storage systems, including industrial parks, data centers, communication base stations, government buildings, shopping malls and hospitals. Industrial parks with large roof areas and where power generation by PV panels coincides with peak consumption are a typical application scenario. Equipped with integrated solar panel and energy storage systems, industrial parks can effectively reduce electricity costs.





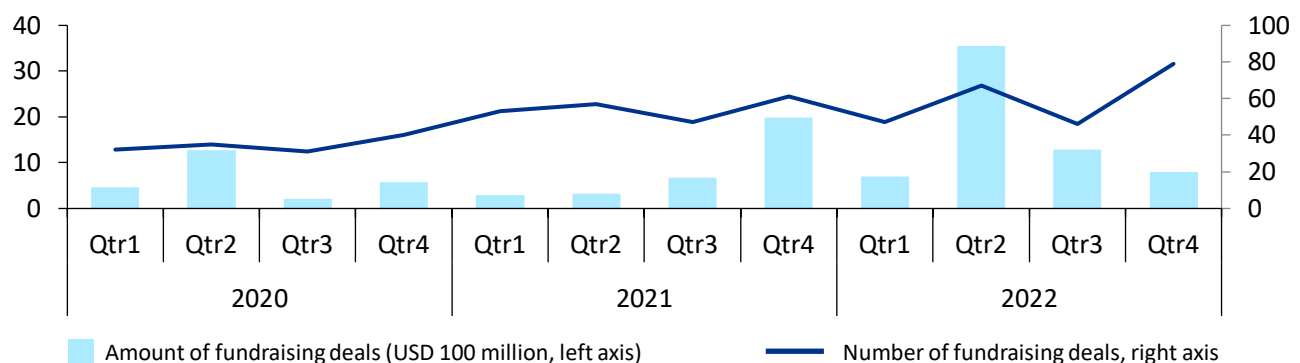
# 3. The energy storage industry is favoured by investors, with enterprises stepping up efforts to expand

China’s 30/60 carbon goals have significantly boosted the development of energy storage technologies. The sector, which has gone through the initial commercial stage, is developing at a rapid pace and on a large scale.

## Energy storage-related fundraising deals worldwide continue to increase; battery and material manufacturers are sought after in China

In terms of investment and fundraising, the number of energy storage-related fundraising deals worldwide continues to increase. According to the Pitchbook database, the amount raised globally increased by 30% YoY in 2021. The momentum continued into 2022 when global energy storage companies raised USD 6.3 billion, a YoY increase of 94% (Figure 13).

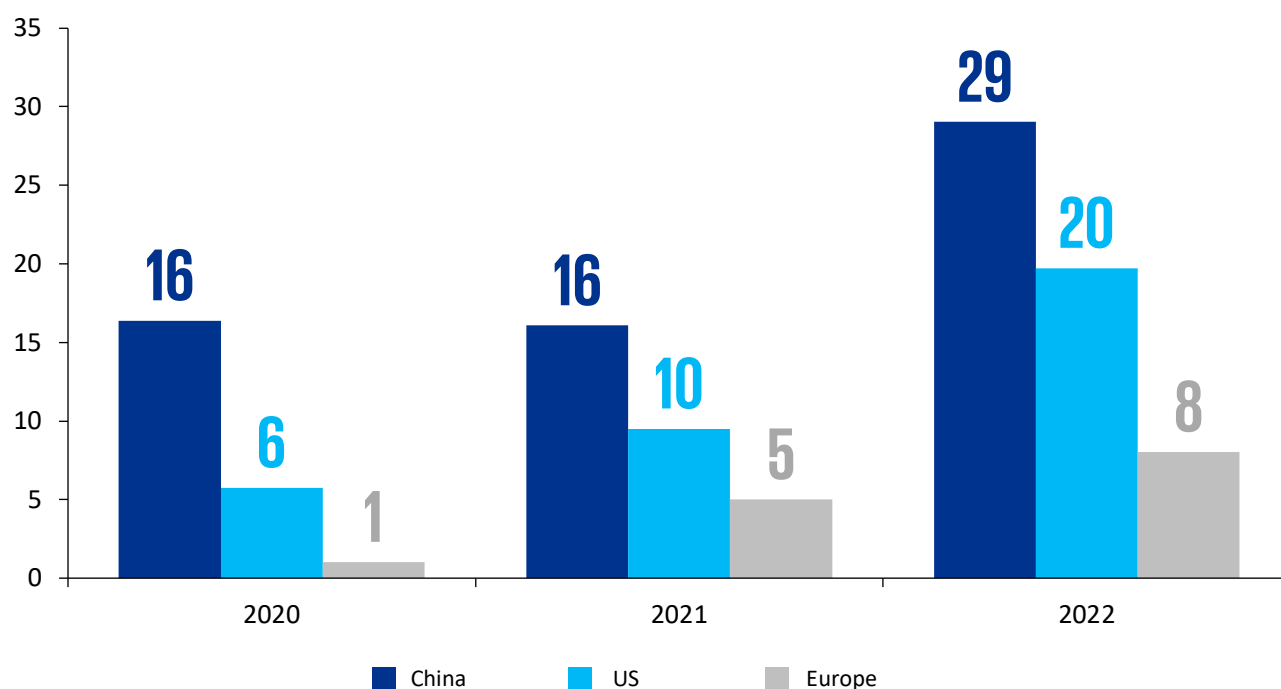
**Fig. 13** | Number of energy storage-related fundraising deals worldwide and amount of funds raised from 2020 to 2022 (on a quarterly basis)



Source: Pitchbook, KPMG analysis

China, the US, and Europe are the main players. In 2022, they accounted for 90% of global energy storage-related fundraising deals (China for 46%, the US for 31%, and Europe for 13% respectively), raising USD 2.9 billion, USD 2 billion, and USD 800 million, respectively (Figure 14).

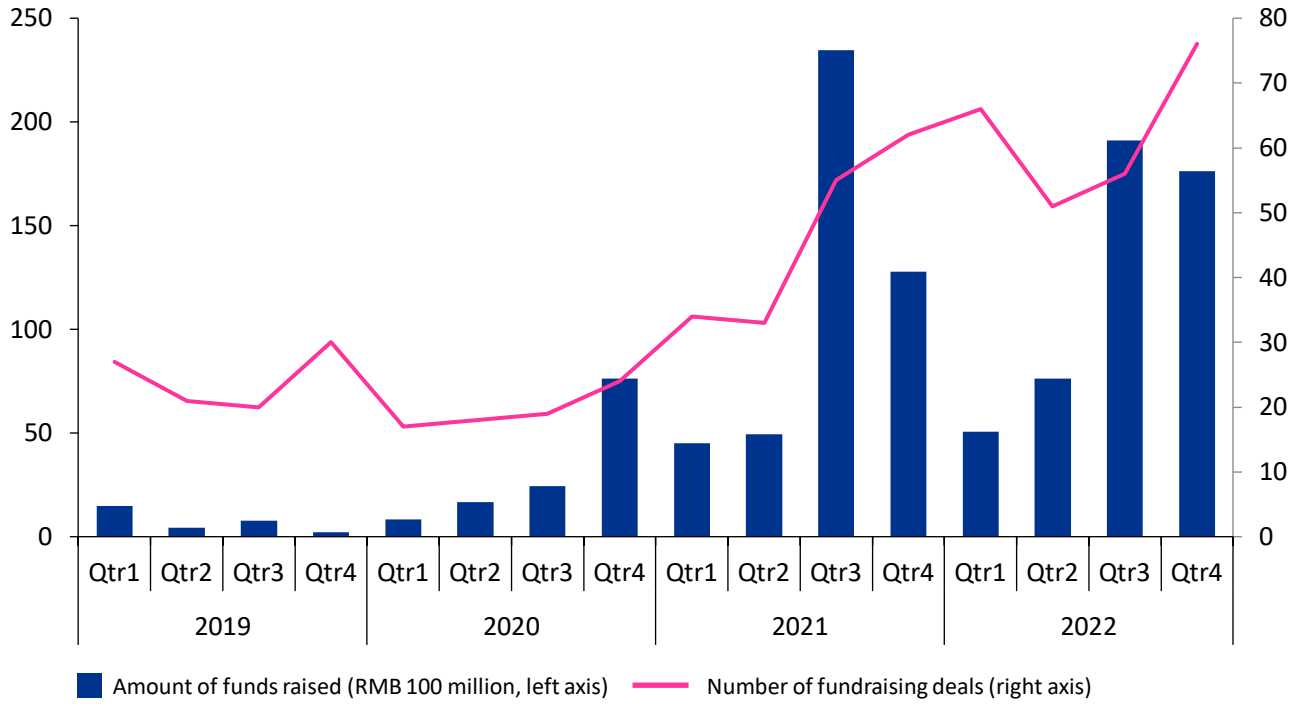
**Fig. 14** | Energy storage-related fundraising in the US, Europe, and China from 2020 to 2022 (USD billion)



Source: Pitchbook, KPMG analysis

China’s energy storage industry is raising a rapidly increasing amount of finance concentrated in a few provinces. According to data from CV Source, the number of fundraising deals and the amount of funds raised by the energy storage industry have increased significantly since the second half of 2020. It is becoming another sought-after new energy segment among investors, in addition to PVs and electric vehicles. Based on data from CV Source, the energy storage industry remained a hot spot in 2022, with 249 fundraising deals and RMB 49.4 billion raised across the sector throughout the year. The amount of funds raised is 16 times that of 2019 (Figure 15).

**Fig. 15** | Number of fundraising deals and amount of funds raised by the energy storage industry from 2019 to 2022 (on a quarterly basis)

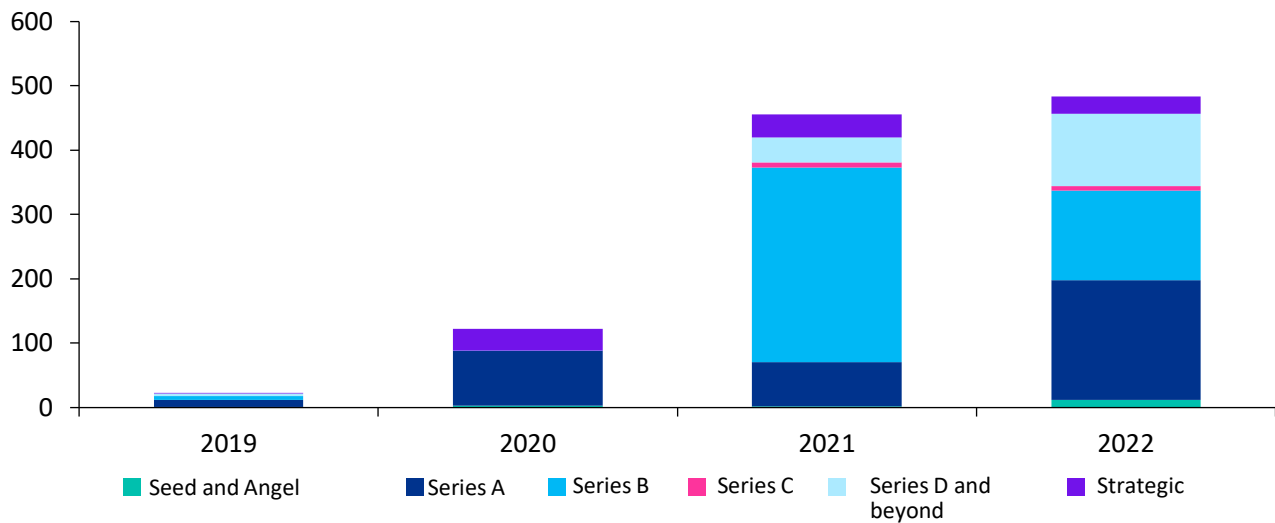


Source: CV Source, KPMG analysis



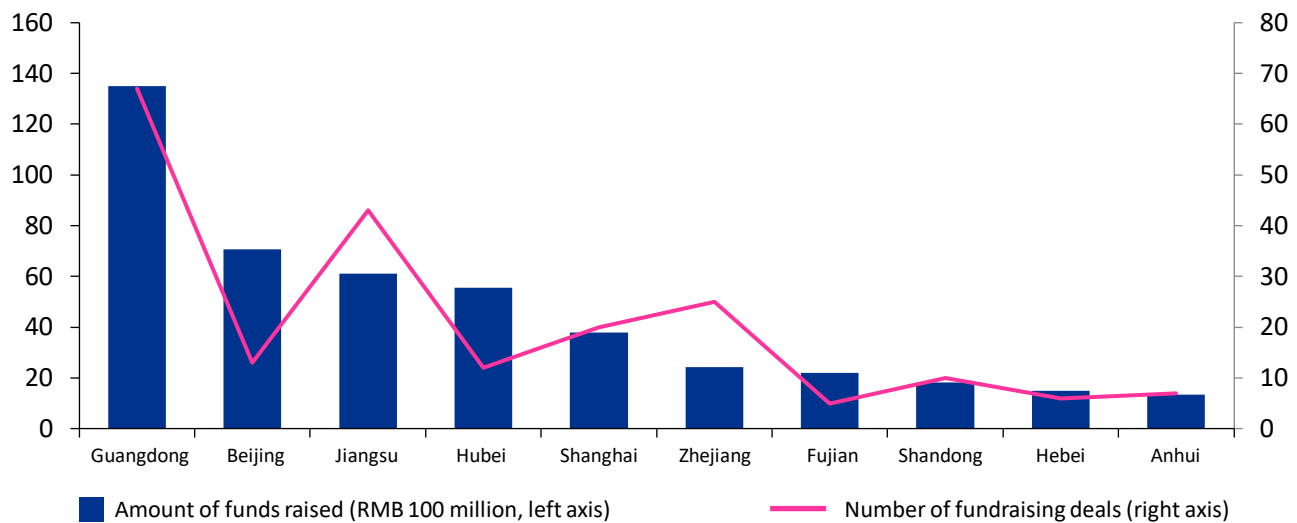
China’s energy storage industry is in its infancy, with lots of new entrants in early fundraising stages. In 2022, industry players raised RMB 32.5 billion in Series A and Series B funding, accounting for 66% of the total (Figure 16). From a regional perspective, energy storage enterprises in the top 10 provinces raised a total of RMB 45.3 billion in 2022, accounting for 92% of the national total. The local energy storage industry in Guangdong Province raised RMB 13.5 billion in 67 deals, making Guangdong the top player in terms of both number of deals and funds raised (Figure 17).

**Fig. 16** | Funds raised by the energy storage industry from 2019 to 2022 (by Series, in RMB 100 million )



Source: CV Source, KPMG analysis

**Fig. 17** | Top 10 provinces (municipalities) in terms of funds raised by local energy storage industry in 2022



Source: CV Source, KPMG analysis

Battery manufacturing is the main growth segment in China’s energy storage industry, with upstream material producers also sought after by investors. Big fundraising deals are not infrequent in the industry. In 2022, battery enterprises raised RMB 31.7 billion, accounting for 64% of the total across the whole energy storage industry. Upstream enterprises in the energy storage industry, including producers of positive and negative electrode materials, raised RMB 10.8 billion in 29 deals. Sunwoda Battery raised RMB 8 billion and became the largest fundraiser in the energy storage industry in 2022 (Figure 18).

**Fig. 18** | Funds raised by energy storage enterprises in 2022 in RMB billion (by segment)

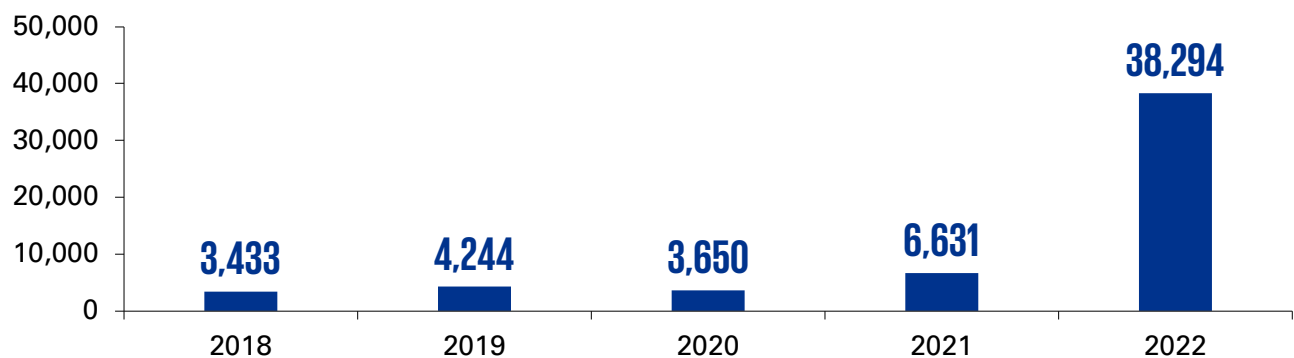
**There is a surge in the number of newly established energy storage-related enterprises; they are mainly engaged in pumped and electrochemical energy storage in a few provinces**



Source: CV Source, KPMG analysis

Before 2021, between 3,000 and 4,500 energy storage-related enterprises were established in China each year. However, as the energy storage industry gained momentum, 38,294 energy storage-related enterprises were established in 2022, which was 10 times the number in 2020 and nearly six times the number in 2021 (Figure 19).

**Fig. 19** | Number of newly established energy storage enterprises from 2018 to 2022



Source: Tianyancha, KPMG analysis

Note: Energy storage related enterprises in this report include those engaged in related areas across the whole industry chain, covering energy storage systems and components thereof, materials, engineering design, technical support, project investment and operation.

In terms of regional distribution, Guangdong and Jiangsu have been benefiting from a cluster effect. In 2022, there were 4,044 and 3,225 newly established energy storage-related enterprises in Guangdong and Jiangsu, accounting for 10% and 8%, respectively (Figure 20).

**Fig. 20** | Newly established energy storage enterprises in 2022 (by province)



Source: Tianyancha, KPMG analysis

In terms of segment, state power enterprises are the major players in pumped storage, while also building electrochemical energy storage stations. Private enterprises focus on the electrochemical segment, with the battery sub-segment recording the largest number of entrants. Pumped storage still dominates China’s energy storage market, with the main investors State Grid and China Southern Power Grid collectively accounting for over 90% of the market. As of 2022, a total of 78 listed private enterprises have entered the electrochemical segment, with the majority (45) focusing on the battery sub-segment, followed by lithium battery materials (19) and energy storage systems (13).

# 4. Opportunities and challenges for the energy storage industry

As the new energy industry accelerates, countries have high hopes for new energy storage technologies as a solution to improve energy efficiency and safety. At the same time, the industry also faces challenges around economic performance, safety, policies and competition in the market.



**On the consumer side, industrial and commercial energy storage projects in China are developing quickly, while residential energy storage projects are flourishing in overseas markets.**

For Chinese industrial and commercial consumers, TOU electricity prices and electricity premiums for energy-intensive enterprises have improved the economics of peak load shifting. In addition, China boasts a large lithium battery market. These strengths drive the new energy market. In terms of residential energy storage, overseas markets hold great potential due to high electricity prices, increased new energy adoption and unevenly distributed power grids. It is easy for market participants to secure handsome profit margins. Compared with their peers in Europe and the US, Chinese enterprises have a relatively smaller share in the end-product market. However, Chinese power battery companies and PV inverter companies are strongly competitive in the lithium battery and energy storage converter markets, which are key parts of the supply chain for consumer-side energy storage projects. They are making sustained efforts to explore overseas consumer energy storage markets.



### **Energy storage enterprises should adopt differentiated strategies to build their core competitiveness in view of the competitive downstream landscape.**

For Chinese energy storage companies, the consumer-side energy storage market is primarily overseas and B2C in nature. They rely more on channels and branding to expand their footprints, and whether they will be able to find their footing in the local market will be key to their further development. Energy storage projects by generators, grids, and industrial and commercial consumers are a B2B market, mainly in China. Therefore, the pool of resources, availability of channels, system safety, and cost control are the key success factors.



### **Enterprises struggling under a monotonous revenue model resort to undercutting, giving rise to safety and sustainability concerns.**

According to a survey conducted by KPMG, a typical energy storage-related enterprise generates a gross profit of approximately 30% (50% in the case of battery separator manufacturers for electrochemical energy storage). A number of listed energy storage enterprises have seen a downward trend in their gross profits. This does not augur well for the market in terms of long-term competition. There will be safety risks associated with excessive cost control and an indifference to quality.



### **Independent energy storage stations enjoy good long-term prospects, though this segment is sluggish in the short term.**

According to CNESA data, the capacity of independent energy storage stations planned or under construction in China in the first half of 2022 was 45.3GW, accounting for over 80% of all new energy storage projects planned or under construction. However, the scale of new independent energy storage stations put into operation in China in the first three quarters of 2022 was approximately 345.5MW, which was significantly lower than planned or under construction stations. The main reason for this may be that investors lack motivation. When calculating return on investment, a variety of factors needs to be considered such as compensation for auxiliary services, price differences in the spot market, and costs for leasing new energy capacity. Under the current electricity market mechanism, these factors are linked to changes in policies and rules. They are highly volatile and difficult to quantify. To promote the implementation of independent energy storage stations, it is necessary to further optimise the electricity market mechanism.





### Speculative investors need cool thinking to identify promising segments and targets.

Investor participation is beneficial for the development of the energy storage industry. Facing trends, they should keep a cool head in assessing business models to identify high-quality segments and targets. Industry giants are already present in some hot segments, such as electrochemical energy storage, making it almost impossible for new investors to enter. Segments that are still in the early stages of development are not very profitable, and many venture capitalists are choosing to go upstream in the industry chain. In terms of targets, high-potential enterprises are relatively concentrated and overvalued. Many of them have not developed a stable and sound business model, making it challenging for investors to identify high-quality projects.



### Establishing a market-oriented mechanism for energy storage players to pass on costs is key to the industry's further expansion.

The energy storage industry is going through a critical period of transition from the early commercial stage to development on a large scale. Whether it can thrive in the next stage depends on its economics. Top-level design is necessary to improve the way costs are passed on, so as to enhance the industry's economic performance in a market-oriented manner. In April 2022, the Center for Price Cost Investigation under the National Development and Reform Commission released an article entitled *Improving the Cost Compensation Mechanism for the Energy Storage Industry to Help Build a New Power System in Which New Energy Plays a Major Role*. It calls for the top-level design of energy storage-related policies with solutions to the bottleneck hindering the industry's development, thereby enabling various energy storage technologies to flourish.



# Contact us

## Steering Committee

Michael Jiang	Head of Clients and Markets, KPMG China
Alex Choi	Head of Energy and Natural Resources, KPMG China
Frank Mei	Head of Power and Utilities, KPMG China
Yongdong Liu	Deputy Secretary General, CEC; President, CEC Electric Transportation & Energy Storage Association

## Research Team

<b>KPMG China</b>	
Kevin Kang	Chief Economist, KPMG China
Wei Wang	Associate Director of Research, KPMG China
Lilia Ma	Manager of Research, KPMG China
Fannie Cheng	Assistant Manager of Research, KPMG China
Cynthia Li	Sector Executive, Energy and Natural Resources, KPMG China
Mindy Du	Assistant Manager, Power and Utilities, KPMG China

## Acknowledgements

### KPMG China

Daisy Shen	Head of Climate Change And Sustainable Development, KPMG China
Oliver Fu	Head of Audit - Power and Utilities, KPMG China
Xiaochen Li	Partner, Energy and Natural Resources, KPMG China
Jing Li	Partner, Deal Strategy and M&A, KPMG China
May Zhou	Partner, Deal Strategy and M&A, KPMG China

### China Electricity Council

Guangbin Xu	Director of Department of International Corporation, CEC
Linyan Zhang	Vice Director of Department of International Corporation, CEC
Dongye Liu	Vice Director of Department of International Corporation, CEC
Wu Wei	Deputy Secretary General, CCPIT Electric Power Industry Office

### CEC Electric Transportation & Energy Storage Association

Libo Zhou	Vice Secretary General, CEC Electric Transportation & Energy Storage Association
Xiaoguang Ma	Vice Secretary General, CEC Electric Transportation & Energy Storage Association
Xiaokun Ma	Director of General Business Department, CEC Electric Transportation & Energy Storage Association
Haiwei Ma	Director of Energy Storage Business Department, CEC Electric Transportation & Energy Storage Association
Huiming Zhang	Expert of Energy Storage Business Unit, CEC Electric Transportation & Energy Storage Association

### Designer

Michelle Liang	Designer, KPMG China
----------------	----------------------

## About KPMG China

KPMG China has offices located in 31 cities with over 15,000 partners and staff, in Beijing, Changchun, Changsha, Chengdu, Chongqing, Dalian, Dongguan, Foshan, Fuzhou, Guangzhou, Haikou, Hangzhou, Hefei, Jinan, Nanjing, Nantong, Ningbo, Qingdao, Shanghai, Shenyang, Shenzhen, Suzhou, Taiyuan, Tianjin, Wuhan, Wuxi, Xiamen, Xi'an, Zhengzhou, Hong Kong SAR and Macau SAR. Working collaboratively across all these offices, KPMG China can deploy experienced professionals efficiently, wherever our client is located.

KPMG is a global organisation of independent professional services firms providing Audit, Tax and Advisory services. We operate in 143 countries and territories with more than 265,000 partners and employees working in member firms around the world. Each KPMG firm is a legally distinct and separate entity and describes itself as such. KPMG International Limited is a private English company limited by guarantee. KPMG International Limited and its related entities do not provide services to clients.

In 1992, KPMG became the first international accounting network to be granted a joint venture licence in mainland China. KPMG was also the first among the Big Four in mainland China to convert from a joint venture to a special general partnership, as of 1 August 2012. Additionally, the Hong Kong firm can trace its origins to 1945. This early commitment to this market, together with an unwavering focus on quality, has been the foundation for accumulated industry experience, and is reflected in KPMG's appointment for multi-disciplinary services (including audit, tax and advisory) by some of China's most prestigious companies.

## About CEC Electric Transportation & Energy Storage Association

The Electric Transportation & Energy Storage Association is a branch under China Electricity Council (hereinafter referred to as "CEC"). It was established under the concerted decision of the CEC Board and implements the Constitution of CEC. The Electric Transportation and Energy Storage Association currently has more than 100 member firms, and State Grid Smart Internet of Vehicles Technology Co., Ltd. and GCL (Group) Holdings Co., Ltd. are the executive vice president firms. The Electric Transportation and Energy Storage Association is driven by market demand, based on members' demands, aimed at industry development, and guided by government requirements, and is committed to promoting the clean, efficient, innovative and coordinated development of China's transportation industry, and playing its due contribution to ensuring the security of national power energy in better serving the country's economic and social development.

[kpmg.com/cn/socialmedia](https://kpmg.com/cn/socialmedia)



**For a list of KPMG China offices, please scan the QR code or visit our website:**

<https://home.kpmg.com/cn/en/home/about/offices.html>

The information contained herein is of a general nature and is not intended to address the circumstances of any particular individual or entity. Although we endeavour to provide accurate and timely information, there can be no guarantee that such information is accurate as of the date it is received or that it will continue to be accurate in the future. No one should act on such information without appropriate professional advice after a thorough examination of the particular situation.

© 2023 KPMG Huazhen LLP, a People's Republic of China partnership, KPMG Advisory (China) Limited, a limited liability company in Mainland China, KPMG, a Macau (SAR) partnership, and KPMG, a Hong Kong (SAR) partnership, are member firms of the KPMG global organisation of independent member firms affiliated with KPMG International Limited, a private English company limited by guarantee. All rights reserved. Printed in Mainland China.

The KPMG name and logo are trademarks used under license by the independent member firms of the KPMG global organisation..